5.0 Facility

5.1 Introduction

Design of new education facilities at Oliver Ranch begins with examination of other places for learning in the environment as well as current thinking about appropriate architecture for our primary audience (5th graders).

The following text, excerpted from research done for this project, includes conclusions based upon the writings of a number of important environmental educators including David W. Orr (Earth in Mind) Stephen Trimble and Gary Paul Nabhan (Geography of Childhood)

The complete paper, Preliminary Research for Environmental Education Facilities at Oliver Ranch by Jenifer DaRoss of Line and Space, LLC, including bibliography can be found in the Appendix B of this Program.

LW

Places for learning in the environment:

There are hundreds of varieties of environmental education (EE) centers throughout the world, all very different. From greenhouses and weather stations built by students behind elementary schools, or mapped and guided hiking trails, to extensive aquariums and multimillion dollar theme park-like "edu-tainment" centers. What they all have in common is that they exist to teach social responsibility and appreciation for our environment. They are all learning laboratories conceived with the purpose of fostering a sense of stewardship in visitors, a desire to protect the natural world, and a re-linking of our humanity to nature.

Typical environmental education centers often contain teaching facilities and classroom, conference facilities, demonstration and auditorium spaces, interactive laboratories and exhibits, extensive libraries, varieties of hands on learning opportunities such as gardening areas, integrated trail systems for nature hikes, bird watching, composting, water harvesting and recycling programs. Many centers are built on the camping model with the belief that the best way to understand nature is to spend prolonged periods immersed in it. These types of centers are equipped with cabins or other sleeping facilities, and dining halls, as well as instructional and interactive areas. Many centers are geared particularly towards one age group, while others attempt to provide facilities to reach out to entire communities.

JdR

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Appropriate architecture for our primary audience:
The primary audience for this facility is Clark County fifth graders. These students are considered to be in the group known as late childhood (ages 7-11).

The learning environment for the older child is quite different then that of the young child. While indoor spaces should still integrate with outdoor spaces and nature as a whole, and still cultivate a sense of adventure and discovery - there are substantially different needs to be addressed. Children are ready to integrate learning with nature on a grander scale. Depending on the curricula – spaces can become highly specialized – science labs, weather stations, wind towers. Indoor and outdoor spaces need to be larger to accommodate activities that encourage communion with nature – such as scavenger hunts, mapping, in some cases - archaeological digs. Wild outdoor play areas can be integrated with orderly gardens and greenhouses, or biomes and micro-habitats. The built environment should mix with the natural environment in an interesting and important way.

JdR

5.2 General goals and objectives

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Facility goals and objectives are far ranging but clearly contain a common thread emphasizing the importance of place while demonstrating clear respect for the environment. Making a facility which is a model of resource conservation (see sustainability goals, next section, immediately following) and offer creative teaching/learning alternatives to the normal inside classroom setting were also paramount. Participants stressed that the facility should feel like it is an extension of the land, a place where the distinction between inside and outside is blurred.

The following goals, shown in bold text, have been derived from general input during the programming workshop.

Goal: Integrate the school at Oliver Ranch into the Valley wide movement in environmental education.
This project is one of many environmental education opportunities within the Las Vegas area **…** topics will vary among venues **...** ultimately one should be able to see measurable results such as an increase in science related careers, valley wide decrease in per capita water and energy use and an increase in adoptions of wild horses and burros

Goal: The school should be part of the neighborhood
Partnership with adjacent communities like Blue Diamond **…** possible actual stewardship activity with neighborhood

Goal: Consider transportation issues
Assume children will be arriving by bus **…** use sustainable methods for transporting kids to different venues **…** after arriving walking should be the primary mode of movement for students among **…** parking should be limited **…** limit impact of school(especially traffic) on surrounding communities

Goal: Create entry/exit sequences that are an integral part of educational experience.
Arrival could include gathering at a central space for orientation, introduction to instructors, etc. **...** the experience at Oliver Ranch should not end abruptly; there should be a somewhat prolonged (possibly ceremonial) departure sequence

Goal: Design specifically for the site
Demonstrate the interrelationship between the building and the landscape that molds the living environment **...** the building and landscape together can teach how to create the micro-environments that form pleasant/comfortable interior and exterior living spaces **...** how these micro-environments have been established by human inhabitants over time and how they may continue to evolve into the future here at this school and how this

school together with its students will contribute to the evolution of this technology

Goal: Create a building that respects the land
Collect and use materials from the site for the buildings **…** be in harmony with the environment

Goal: Utilize timeless, low maintenance, site appropriate materials.
Utilize native stone **...** use stone as a focal point **…** use materials that are of the desert itself **…** the building should reflect the geology **…** consider burrowing **…** LW note: Materials that will be considered include native stone, exposed concrete, both painted and weathered steel. These "natural materials" will be juxtaposed against the more technical aspects of glass, natural aluminum, various types of finished wood, and possibly exposed mechanical systems.

Goal: Examine potential for utilizing existing cultural resources
Honor the cultural history **…** LW note: As to the ranch buildings, there may be the possibility of saving the center portion of the westerly building as well as certain aspects of part of the "foot print" **…** stone may be salvaged and recycled

Goal; Do not add to the existing level of light pollution
Conform to Standards of International Dark sky association

Goal: Create an intimate experience between students and environment
During explorations, groups of students should be relatively isolated (acoustically and visually) from each other … LW note: Scale is a fundamental consideration.

Goal: The facility should foster the sense of learning in the environment as opposed to environmental learning.
Use outdoor rooms and labs **…** a designated space for astronomical observations **…** strive for acoustical control (feeling of immersed in environment, quiet) **…** the number of users must be limited by ability of environment to support them **…** accommodate class sizes of 35 **…** teach kids to take care of themselves

Goal: Provide a variety of flexible teaching venues
Accommodate all students in protected teaching venues during inclement weather **…** eliminate traditional classrooms in favor of flexible laboratory teaching spaces

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Goal: Consider multiple uses of space in order to optimize construction budget and operating costs
Dining room should be created large enough to accommodate all students for special events and during inclement weather **...** the dining space should be divisible **…** other non traditional teaching spaces such as the greenhouse and wetlands equipment buildings should be large enough for 12 students and their instructor

Goal: Integrate ideas proposed by CCSD 5th graders.
In general the students: Seemed to be in favor of larger sleeping rooms; 6-8 children instead of 4-6 **...** were evenly divided over preference for bunk beds vs. one level beds although there was unwavering unanimity when alternative sleeping possibilities such as sleeping in hammocks was suggested **…** favored windows that would allow them to see out from their sleeping areas including the night sky; one or two were worried about people being able to see in **…** suggested group meeting/working areas within their bunk group including large table/chairs, bean bags and other types of comfortable seating, a nook, book shelves, computers, etc. **...** wanted privacy for showering and toilet use **…** were concerned about not having TV **…** articulated the need for choices in terms of indoor and outdoor learning and eating possibilities. When it was offered that outdoor experiences would occur during nice weather they were more uniformly in favor of the concept **...** apecific suggestions that occurred more than once included providing telescopes, meeting "pits" and special windows (including fresh air) in the bedrooms, a greenhouse, camping out and having good food. A place to play sports was mentioned

One particularly provocative suggestion was that computers would "allow the kids at the Science School to talk with other classes that were not able to be at the facility". Another stated, "draw what you see, then you will have a souvenir to take home"; and, an extremely perceptive young person volunteered to develop his idea for flushing toilets with grey water.

The concept of competing among groups to determine who could conserve the most water was popular with everyone except for the rare individual who "needs to take three showers a day!"

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Goal: The facility should be a venue for long-term studies/research (this is subordinate to the goal of educating 5th graders[9]).
Provide a small, professional research lab and library **…** allow for student visits **…** possibilities include resource management, particulate measurement and restoration of Oliver Ranch itself

[9]*Per BLM – 7/9/2004*

Goal: Integrate work of Master Gardeners (this is subordinate to the goal of educating 5th graders[9]).
Preserve existing environment **…** teach kids to grow plants **…** develop new techniques for propagation **…** create a nursery for on site desert restoration projects **…** explore cultural agriculture vs. indigenous species

Goal: Provide a durable framework which allows for changes in curriculum, operational and business models as well as technology.
Flexibility **…** durability **…** flexibility to accommodate varying weather

[9]*Per BLM – 7/9/2004*

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5.3 Sustainability goals and objectives

Goals were developed as a result of workshop input. Following each goal below is actual commentary from participants.

Goal: Promote long term change in all facility users' attitude towards the environment[9]**.**
Increased stewardship **…** a long waiting list **…** inspired youth

Goal: Create a facility that engages the students in actively managing energy and water.
This is a place where conservation is practiced **…** the buildings themselves encourage participation in resource management

Goal: Create a facility that is a paradigm of environmental design.
Reduce dependence upon energy **…** have this school be the best in the US for lowest overall water consumption **…** use state of the art water saving fixtures **…** this must be a place where conservation is practiced **…** unique, but in context **…** balance between human activity and natural resources **…** encourage respect, conservation, balance in community, and home life **…** increase awareness and stewardship of natural environment **…** expose operating systems, utilities, ductwork, etc. **…** by exposing systems and environmentally sound design practices in a simple and clear manner **…** visible examples of energy efficiency **…** sustainable design as an exhibit **…** reduce dependence on energy resources **…** fit into the environment **…** demonstrate how a building can fit and be a part of the environment around it **…** properly orient buildings to encompass passive heating and cooling: use straw bales for construction, thick walls = climate control inside **...** orient the building to take advantage of shade **…** shade structures could represent different desert homes (burrow, native structure, nest, etc.) **...** transitional shade areas **…** do not build in a flood plain area!!

Goal: Construct a facility that maximizes the use of renewable or recyclable resources.
Use sustainable materials **…** use of recycled materials, i.e. imploded casinos **…** recyclables can be beautiful **…** demonstrate how technology both helps and hinders sustainability (low-tech) **...** consider options for recycling (building materials) - demonstrate recycled materials in building

[9] *Per BLM – 7/9/2004*

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Goal: Create a facility which is, an exhibit of energy conserving, responsible, design
Building is transparent use of resource conservation and interpreted (should double as exhibits) **…** visible examples of energy efficiency **…** facility should teach about insulation **…** transparency of operations (water, trash) – visible & measurable **…** actual transparent waste/recycle containers to view relative amounts **…** using natural light **…** mass walls maintain a more consistent inside temperature, transitional **…** there are many ways to save energy and one person can make a difference (measurable waste) **…** if a building is built w/ a sustainable focus, it can teach occupants about how connected time and space are using renewable energy sources **…** by having exposed utility lines, ductwork, mechanical systems, wires, etc. the occupant can learn what happens to the air, water, and energy entering and exiting the structure **...**. conservation of energy (by using the sun or shade to heat or cool) **…** solar orientation (windows/doors) – sundial

Goal: Rely upon alternative methodologies for a significant aspect of power and waste disposal.
Demonstrate use of photovoltaics **…** utilize a wetlands waste disposal process. Note dependant upon round 5 funding

Goal: Exceed local and national energy sustainability (including energy conservation) standards.
Become LEED certified **…** the level of certification, (silver, gold etc.) is not as important as creating a facility which clearly is environmentally responsible

> *Members of the U.S. Green Building Council developed the LEED (Leadership in Energy and Environmental Design) Green Building Rating System, a voluntary, consensus-based national standard for developing high-performance, sustainable buildings. This rating system defines "green" building" by establishing a common standard of measurement. This rating system promotes integrated, whole-building design practices. It recognizes environmental leadership in the building industry and raises consumer awareness of green building benefits. LEED provides a complete framework for assessing building performance and meeting sustainability goals. It emphasizes state of the art strategies for sustainable site development, water savings energy efficiency, material selection, and indoor environmental quality.*
>
> *Source: U.S. Green Building Council*[6]

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Goal: Introduce concepts of resource preservation which are transferable to the community at large.
Efficiency (min. use of resources) **…** show how activities relate to the 'average' – for example- 'this building orientation, design & use of natural elements (plantings, etc.) to reduce dependency on power consumption: trees shade in summer but allow natural heating in winter

5.4 Parking

Parking is primarily for administration, staff and buses. Because of controlled access very little public parking is required.

In order to avoid construction of large parking areas along with their negative environmental/visual impact we have assumed, that for special public events, parking will be provided at the Visitor Center utilizing buses as a shuttle. In this way, also, visitors will have the opportunity to experience the same entry and departure sequences that the students enjoy.

Parking will be provided at Oliver Ranch as follows:

Visitors	20 spaces*
Visitors HC	2 spaces
Vans	7 spaces
Buses	3 spaces
Administrative Staff	7 spaces**
Administrative Staff HC	1 spaces
Kitchen Staff	6 spaces**
Instructors	10 spaces
Instructors HC	2 spaces
Caretaker	2 spaces
Service Vehicles	3 spaces

* This number is the cross over point when offsite parking will be utilized, i.e., 40 persons (2 per auto) are more or less a bus load.
** Actual number utilized will vary with staffing (based upon business plan).

Goal: Reduce parking requirements by encouraging car pooling and use of alternative transportation among staff. [9]

Goal: Incorporate concepts of sustainability into parking lot construction. [9]
Non traditional (porous or unpaved surfacing…Recycled materials…. Shading ….. Water harvesting
[9] *Per BLM – 7/9/2004*

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5.5 Operating schedule

The School at Oliver Ranch is a residential facility intended to be operated around the clock, every day, all year.

It is expected that students from Clark County School District will be in attendance weekdays when schools are in session.

Currently CCSD has a number of schools on a 12 month schedule implying, that the School at Oliver Ranch will be serving CCSD students all year.

Weekends and CCSD breaks for vacations and holidays will provide opportunities when the facility may be available for use by others in support of the NCA mission. No schedule for ancillary programs has been determined.

It is to be noted that wear and tear on the facility (as well as staff and the land itself) may dictate downtime for maintenance and rest.

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5.6 Systems

The Oliver Ranch campus will include the following systems:

Fire Protection:
The Oliver Ranch School will include a fire protection system consisting of water storage, pressure system (UL fire pump), and sprinklers within administration spaces, labs, dining, kitchen, student sleeping areas, instructor housing and maintenance shop. It is possible that this system will be shared with the WHB facility.

Standard school fire and smoke alarm/monitoring equipment will be installed through out.

Requirement and implementation of fire hydrants connected to this type of system will be discussed with the local fire district.

Communication and Clocks:
An audio communication and central clock network will be provided for all major spaces.

Security:
A central security alarm system will be provided. Webcam-type networking(integrated into other uses) is contemplated.

Data:
In anticipation of current and future Information System (IS) requirements, all spaces will have access to a data network connected to a central server (housed in the Administrative Server/Telephone Room) either by data cable or wireless connection. Due to the recent advances in wireless network technology, it is assumed that the facility will depend more on this technology than running multiple data cables.

Environmental Space Conditioning:
Conventional, high efficiency air conditioning and or evaporative cooling is contemplated for certain spaces. Active and passive heating and cooling techniques will be utilized throughout.

An energy management system (EMS) will be incorporated along with interpretable, graphic, communication of energy usage.

Sewer/black water:
An ecologically friendly waste disposal system will be incorporated. It is expected that this will be done in conjunction with an artificial wetland process and/or other natural treatment systems.

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Recycling/composting:
A centralized recycling/composting area will be provided.

Gray water:
Treated (perhaps by solar methods) and recycled gray water will be plumbed separately from black water for use in irrigation and perhaps toilet flushing.

Hot water:
Solar-heated water will be located near individual places of use, although, we will examine the feasibility of a distributed system.

Potable water:
A water source (perhaps disinfected through the use of solar concentrators) and delivery system will be created. Depending upon results of well studies various possibilities include an on site well system (preferred) or piping from other sources.

Rainwater harvesting
Rainwater falling upon structures will be captured and utilized. Recognizing the limited but high flow rain flow issues it is expected that this water will be primarily used for demonstrating concepts of conservation as well as celebration of rainfall and the importance of water in the desert.

Power and lighting:
A combination of grid supplied and alternative energy methods including photo voltaic (possibly in conjunction with concentrators, tracker, thin film weather membranes, etc.), wind power (for pumping, etc.), bio-gas as well as by technologies not yet considered.

Energy-efficiency will be maximized through the use of daylighting, LED light sources and dimmable fluorescent bulbs/ fixtures while still providing lighting appropriate to the task at hand (including security needs).

Note: Work beyond conceptual design for a number of systems or portions of systems mentioned is dependant upon success of Round 5 SNPLMA funding